AMENDMENTS

In the Claims:

Please amend the claims as indicated hereafter.

1. (Currently Amended) A multi-function unit of a graphics system, comprising:

a hierarchical tiler configured to occlusion test primitives, the primitives comprising a maximum Z value and a minimum Z value, the maximum and minimum Z values associated with respective X-Y coordinate values, the hierarchical tiler further configured to create a Z pyramid data structure as polygons defined by a plurality of primitives are processed by the multi-function unit;

a parameter interpolator coupled to the hierarchical tiler configured to receive the X-Y coordinate values from the hierarchical tiler and generate a Z value at the pixel level for each received X-Y coordinate value;

a pixel-level comparator coupled to the parameter interpolator configured to determine at a pixel level which values need to be written by a frame buffer controller; and

a memory unit coupled to the hierarchical tiler and the pixel-level comparator, the memory unit configured to store a change in ~~a~~ the Z pyramid ~~z-pyramid~~ data structure responsive to an occlusion test result for a visible primitive before the pixel-level comparator determines whether ~~which~~ pixel level values for the visible primitive need to be written by the frame buffer controller.

2. – 3. (Canceled)

4. (Currently Amended) The multi-function unit of claim 1, wherein the Z pyramid ~~z-pyramid~~ data structure is periodically updated in accordance with pixel level values from a Z buffer responsive to the frame buffer controller.

5. (Previously Presented) The multi-function unit of claim 1, wherein the pixel level comparison is performed responsive to pixel level values from a Z buffer responsive to the frame buffer controller.

6. (Previously Presented) The multi-function unit of claim 1, further comprising:

an object function unit coupled to the pixel level comparator and the Z buffer configured to perform at least one function selected from clipping, patterning, transferring, and filling.

7. (Previously Presented) The multi-function unit of claim 1, wherein the hierarchical tiler maintains coverage masks to update the Z pyramid data structure.

8. (Previously Presented) The multi-function unit of claim 7, wherein the Z pyramid data structure comprises a plurality of levels, each level comprising a plurality of regions, each region comprising a plurality of subregions, each subregion comprising a Z value.

9. (Previously Presented) The multi-function unit of claim 8, wherein the hierarchical tiler compares the minimum Z value of each primitive with the Z value of a region to determine if the primitive is occluded.

10. (Currently Amended) The multi-function unit of claim 9, wherein [[~~when~~]] in response to a determination that the visible primitive is not fully occluded, the hierarchical tiler determines whether any subregion of the region is fully covered by the primitive.

11–20 (Canceled)

21. (Currently Amended) The multi-function unit of claim 10, wherein when a present subregion is covered, the hierarchical tiler determines whether the Z value of the covered subregion is to be replaced with the maximum Z value of the visible primitive.

22. (Currently Amended) The multi-function unit of claim [[~~11~~]] 1, wherein the hierarchical tiler maintains a coverage mask for each level of the Z pyramid data structure.

23. (Currently Amended) The multi-function unit of claim [[~~14~~]] 22, wherein when the hierarchical tiler determines that the maximum Z value of the visible primitive is less than the Z value for a covered subregion, a bit in the coverage mask associated with the covered subregion is set.

24. (Currently Amended) The multi-function unit of claim [[~~15~~]] 23, wherein [[~~when~~]] in response to a determination that all the coverage mask bits corresponding to the subregions of a particular region have been set in the coverage mask associated with a first level of the Z pyramid structure, a bit is set for the corresponding region in the coverage mask associated with a next level up in the Z pyramid data structure.

25. (Currently Amended) The multi-function unit of claim [[~~16~~]] 24, wherein [[~~when~~]] in response to a determination that all the bits in the coverage mask have been set for a particular region in the coverage mask, the hierarchical tiler replaces the maximum Z value for the particular region with the maximum Z value of all the subregions associated with the particular region.

26. (Currently Amended) The multi-function unit of claim [[~~17~~]] 25, wherein [[~~when~~]] in response to a determination that all the bits in the coverage mask have been set for a particular region in the coverage mask, the hierarchical tiler sets the corresponding bit in the coverage mask for a next level up in the Z pyramid data structure.

27. (New) The multi-function unit of claim 1, wherein the hierarchical tiler maintains, for the Z pyramid data structure, coverage masks that are separate from the Z pyramid data structure and that indicate which Z values in the Z pyramid data structure need to be updated.

28. (New) The multi-function unit of claim 27, wherein the hierarchical tiler is configured to adjust the coverage mask associated with a particular level of the Z pyramid structure in response to a determination by the hierarchical tiler that the maximum Z value of the visible primitive is less than the Z value for a covered subregion at the particular level of the Z pyramid structure.

29. (New) A method for use in a graphics system, comprising:

defining a Z pyramid data structure;

comparing a minimum Z value of a primitive to the Z pyramid data structure;

determining whether the primitive is occluded based on the comparing;

scan converting the primitive to a pixel level if the primitive is determined to be not fully occluded in the determining; and

updating the Z pyramid based on the primitive prior to the scan converting.

30. (New) The method of claim 29, wherein the Z pyramid data structure comprises a maximum Z value for a group of pixels defining a region, and wherein the Z pyramid data structure comprises a Z value for a first subregion of the region, wherein the method further comprises:

determining whether the first subregion of the region is fully covered by the primitive;

determining whether a maximum Z value of the primitive is less than the Z value for the first subregion; and

changing the Z value for the first subregion to the maximum Z value of the primitive if the first subregion is fully covered by the primitive and if the maximum Z value of the primitive is less than the Z value for the first subregion.

31. (New) The method of claim 30, wherein the region has a plurality of subregions, and wherein the method further comprises:

maintaining a coverage mask for the Z pyramid data structure, the coverage mask having a bit corresponding with each of the respective subregions; and

setting the bit of the coverage mask corresponding to the first subregion if the Z value for the first subregion is changed to the maximum Z value of the primitive.

32. (New) The method of claim 30, further comprising:

maintaining coverage masks for updating the Z pyramid data structure; and

updating at least one of the coverage masks if the Z value for the first subregion is changed to the maximum Z value of the primitive.

33. (New) The method of claim 30, wherein the region has a plurality of subregions, further comprising:

maintaining a coverage mask indicating whether Z values of the Z pyramid data structure for each of the subregions have been updated;

updating the coverage mask in response to the changing; and

updating the maximum Z value for the group of pixels in response to a determination that the coverage mask indicates that each of the Z values for each of the subregions has been updated.